WHAT IS CLAIMED IS:

1. A method for designing a nozzle firing sequence for a print head carrying a plurality of nozzles adapted to be selectively fired to deposit ink droplets on an output medium, comprising the steps of:

(a) designing an array of $S_r \times S_c$ distinct rank elements, one for each firing location on the output medium, the value of each element representing the rank of the corresponding location; and

(b) designing at least one matrix P_{ijn}

wherein (i, j) represents the location and n represents the pass of the print head over the output medium,

wherein each value of P_{ijn} indicates whether or not a nozzle is to be fired at that particular location during that particular print head pass as specified by i, j, n, and

wherein P_{ijn} satisfies the constraint $\sum_n P_{ijn} = K$, where K is an integer greater than or equal to 1 representing the maximum number of droplets that can be deposited at a particular location, the values of P_{ijn} being determined based on n, S_c, S_r and N, where N represents the total number of passes of the print head, and on parameters and properties of the print head and on the properties of the ink and the output medium.

2. A method as recited in claim 1, wherein the parameters of the print head comprise one or more of the following: number of nozzles, nozzle geometry, and nozzle spacing.

3. A method as recited in claim 1, wherein the properties of the print head comprise one or more of the following: its actuation mechanism, and the materials of which it is constructed.

4. A method as recited in claim 1, wherein the properties of the ink comprise one or more of the following: its viscosity and surface tension.

5. A method as recited in claim 4, wherein the properties of the output medium comprise its composition.

6. A method for designing a nozzle firing sequence for a print head carrying a plurality of nozzles adapted to be selectively fired to deposit ink droplets on an output medium, comprising the steps of:

(a) designing an array of $S_r \times S_c$ distinct rank elements, one for each firing location on the output medium, the value of each element representing the rank of the corresponding location; and

(b) designing at least one matrix P_{ijn}

wherein (i, j) represents the location and n represents the pass of the print head over the output medium,

wherein each value of P_{ijn} indicates whether or not a nozzle is to be fired at that particular location during that particular print head pass as specified by i, j, n, and

wherein P_{ijn} satisfies the constraint $\sum_n P_{ijn} = K$, where K is an integer greater than or equal to 1 representing the maximum number of droplets that can be deposited at a particular location, the values of P_{ijn} being determined based on a set of feasible locations maintained in a corresponding, periodically updated, binary-valued array F_{ijn} that is based on constraints resulting from parameters and properties of the print head and on the properties of the ink and the output medium.

7. A method as recited in claim 6, wherein each constraint on which F_{ijn} is based is mapped into a corresponding one of the feasible sets.

8. A method as recited in claim 7, wherein each value of P_{ijn} that is assigned a non-zero value modifies the set of feasible locations maintained in F_{ijn}.

9. A method as recited in claim 8, wherein F_{ijn} is updated with each non-zero assignment of P_{ijn}.

10. An apparatus for designing a nozzle firing sequence for a print head carrying a plurality of nozzles adapted to be selectively fired to deposit ink droplets on an output medium, comprising:

an array-design module configured to design an array of $S_r \times S_c$ distinct rank elements, one for each firing location on the output medium, the value of each element representing the rank of the corresponding location; and

a matrix-design module configured to design at least one matrix P_{ijn}, wherein (i, j) represents the location and n represents the pass of the print head over the output medium, wherein each value of P_{ijn} indicates whether or not a nozzle is to be fired at that particular location during that particular print head pass as specified by i, j, n, and wherein P_{ijn} satisfies the constraint $\sum_n P_{ijn} = K$, where K is an integer greater than or equal to 1 representing the maximum number of droplets that can be deposited at a particular location.

11. An apparatus as recited in claim 10, wherein, in designing the matrix P_{ijn}, the matrix-design module determines the values of P_{ijn} based on n, S_c, S_r and N, where N represents the total number of passes of the print head, and on parameters and properties of the print head and on the properties of the ink and the output medium.

12. An apparatus as recited in claim 10, wherein, in designing the matrix P_{ijn}, the matrix-design module determines the values of P_{ijn} based on a set of feasible locations maintained in a corresponding, periodically updated, binary-valued array

F_{ijn} that is based on constraints resulting from parameters and properties of the print head and on the properties of the ink and the output medium.

13. A machine-readable medium carrying a program of instructions for directing a machine to design a nozzle firing sequence for a print head carrying a plurality of nozzles adapted to be selectively fired to deposit ink droplets on an output medium, the program of instructions comprising:

(a) instructions for designing an array of $S_r \times S_c$ distinct rank elements, one for each firing location on the output medium, the value of each element representing the rank of the corresponding location; and

(b) instructions for designing at least one matrix P_{ijn}

wherein (i, j) represents the location and n represents the pass of the print head over the output medium,

wherein each value of P_{ijn} indicates whether or not a nozzle is to be fired at that particular location during that particular print head pass as specified by i, j, n, and

wherein P_{ijn} satisfies the constraint $\sum_n P_{ijn} = K$, where K is an integer greater than or equal to 1 representing the maximum number of droplets that can be deposited at a particular location, the values of P_{ijn} being determined based on n, S_c, S_r and N, where N represents the total number of passes of the print head, and on parameters and properties of the print head and on the properties of the ink and the output medium.

14. A machine-readable medium as recited in claim 13, wherein the parameters of the print head comprise one or more of the following: number of nozzles, nozzle geometry, and nozzle spacing.

15. A machine-readable medium as recited in claim 13, wherein the properties of the print head comprise one or more of the following: its actuation mechanism, and the materials of which it is constructed.

16. A machine-readable medium as recited in claim 13, wherein the properties of the ink comprise one or more of the following: its viscosity and surface tension.

17. A machine-readable medium as recited in claim 16, wherein the properties of the output medium comprise its composition.

18. A machine-readable medium carrying a program of instructions for directing a machine to design a nozzle firing sequence for a print head carrying a plurality of nozzles adapted to be selectively fired to deposit ink droplets on an output medium, the program of instructions comprising:

(a) instructions for designing an array of $S_r \times S_c$ distinct rank elements, one for each firing location on the output medium, the value of each element representing the rank of the corresponding location; and

(b) instructions for designing at least one matrix P_{ijn}

wherein (i, j) represents the location and n represents the pass of the print head over the output medium,

wherein each value of P_{ijn} indicates whether or not a nozzle is to be fired at that particular location during that particular print head pass as specified by i, j, n, and

wherein P_{ijn} satisfies the constraint $\sum_n P_{ijn} = K$, where K is an integer greater than or equal to 1 representing the maximum number of droplets that can be deposited at a particular location, the values of P_{ijn} being determined based on a set of feasible locations maintained in a corresponding, periodically updated, binary-valued array F_{ijn} that is based on constraints resulting from parameters and properties of the print head and on the properties of the ink and the output medium.

19. A machine-readable medium as recited in claim 18, wherein each constraint on which F_{ijn} is based is mapped into a corresponding one of the feasible sets.

20. A machine-readable medium as recited in claim 19, wherein each value of P_{ijn} that is assigned a non-zero value modifies the set of feasible locations maintained in F_{ijn}.

21. A machine-readable medium as recited in claim 20, wherein F_{ijn} is updated with each non-zero assignment of P_{ijn}.